Develop a Fully Skilled Workforce
Systematic Training Solutions for the Plastics Industry

Online Training / eLearning edition
GIVE YOUR EMPLOYEES THE TOOLS THEY NEED TO SUCCEED
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The information being presented must be relevant to the workplace. A comprehensive in-house training plan incorporates all of the training necessary to instill a good base of fundamental knowledge.

Training must be captivating in order to keep the participants’ attention. Everyone knows that in order to learn, you must pay attention – yet companies often rely on boring lectures and literature to train.

Employees retain significantly more information in an interactive environment. Research has shown a 38% increase in retention when using interactive training compared to other methods.

Curriculum must be tailored to meet the specific needs of your plant. Training media, such as interactive training, can be easily customized to your business at no additional cost.

Trainees often learn a wealth of theoretical information yet do not understand how to apply it to the workplace. The participant needs to develop skills so the knowledge can actually be used.

Tracking the results proves the effectiveness of the training. Facilitators need to use a training method that makes it easy to track and monitor each employee’s progress.

With over 25 years of training experience in the plastics industry, A. Routsis Associates knows the six critical factors that can make or break your company’s in-house training program. Let’s examine these success factors and see how other industry training methods stack up against interactive training.
QUESTION: Can my company really justify spending money to train our employees?

ANSWER: Absolutely, you just need to look in the right place.

At Routsis we are constantly asked “I know we need training, but how do I justify it?” Since poorly skilled employees are the root cause of most production losses, the highest return on investment comes from improving on three categories: scrap, downtime, and equipment damage.

In a recent industry survey, we found that most companies lose over a quarter of a million dollars annually in scrap and reworked parts, yet are not willing to invest even a fraction of this to remedy the problem. As the company expands and grows, the financial losses increase exponentially. Our customers typically realize reductions of over 60% in scrap and rework while also eliminating customer returns – all as a direct result of improving the skills and confidence of their workforce.

Competent Workers Provide Immediate Payback Through:

- Lower scrap rates
- Reduced mold damage
- Decreased machine downtime
- Improved troubleshooting time
- Faster machine startup
- Fewer defects
- Consistent part quality
- Highly repeatable processes
- Shorter cycle times
- Less accidents
- Process optimization
- Increased customer satisfaction
- Quicker changeovers
- Extended tool and machine life
- More energy-efficient processes

“We have seen a 65% reduction in scrap and a 30% cycle time improvement – resulting in a 66% increase in production capacity.”

Justin Reid
Harrington Corp.

“In our first month of training, our scrap dropped 35%, our employees felt more empowered, and they were eagerly anticipating the next step.”

Mark Rhoads
B & M Plastics
Dedicated Training Portals

A company of any size can take advantage of the flexibility offered by having their own company-specific, dedicated online plastics training portal.

Each Learning Management System (LMS) is branded with the company’s logo and can handle all aspects of a blended training initiative; from adding users and creating assignments – to administering offline training events and generating progress reports.

Our Dedicated Training Portals are easy-to-use, yet sophisticated systems that administer and deliver any online course. It runs in your web browser over any Internet connection, does not require additional software and startup is immediate.

Each portal contains over fifty plastics training programs – including all of our Injection Molding, Maintenance, Mold Design, and Part Design courses.

All of our plastics training courses, as well as third party off-the-shelf programs, can be easily customized to include the materials, equipment, procedures and operations used at your facility.

We also offer regularly scheduled ‘Train the Trainer’ webinars so that facilitators can stay up-to-date with respect to LMS administrative tasks and customization practices.

Features include:

- Manage users and departments
- Administer your own web-based training plans
- Create and assign training curriculums
- Convert existing training materials into courses
- Customize existing courses or create new ones
- Track progress and export filtered activity reports

Dedicated Online Plastics Training Portals
Please visit our website or contact us for more details
An Introduction to Injection Molding

The fastest way to get new hires up-to-speed

This course provides participants with a general introduction to the plastics industry. The primary focus of this training program is the day-to-day operations of a typical injection molding facility.

An Introduction to Injection Molding was created for newcomers to the injection molding industry or anyone that would like to learn more about plastics. We recommend that new hires take this course before participating in our Injection Molding Basics series.

Topics covered include:

- An overview of plastics and the industry
- A typical molding facility
- General plant safety
- An introduction to the molding process
- Molding machine components
- Material handling
- Injection mold terminology
- Common part defects

An Introduction to Injection Molding
1 Interactive Training Program (1-2 hours)

PRODUCT ID:  wbt.im.bs.iim
wbt.im.bs.iim.uk  (EU & UK version)
wbt.im.bs.iim.sp  (Spanish Version)
wbt.im.bs.iim.mc  (Mandarin Version)
Injection Molding Basics

*Here’s how you can get all your employees on the same page*

These courses teach employees the three major aspects of injection molding: the Machine, the Process, and the Mold. *Injection Molding Basics* gives new hires a good idea how injection molding works. These programs also serve as excellent refreshers for any employee; from operators and technicians to management and setup personnel.

**Program 1 | Machine**
- Cites important safety precautions for working around injection molding machines
- Gives an introduction to the injection molding process
- Introduces machine types and the different modes of operation
- Discusses the components of the injection molding machine and their respective functions
- General procedures for starting up and shutting down a molding machine

**Program 2 | Process**
- Discusses polymers and the three criteria used to classify them
- Covers some of the more common procedures for material preparation
- Introduces the three phases of the molding process; injection, cooling and ejection
- Explains the need for maintaining an accurate process log
- Defines common injection molded part defects and explains their causes

**Program 3 | Mold**
- Explains the specific functions that an injection mold must perform
- Introduces the various machining methods used to construct a mold
- Discusses the three mold configurations commonly used in the industry
- Covers common runner shapes and gate types
- Gives an overview of proper mold maintenance

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**Injection Molding Basics**

*3 Interactive Training Programs (3-6 hours)*

**PRODUCT ID:**
- wbt.im.bs.imb (EU & UK version)
- wbt.im.bs.imb.uk (Spanish Version)
- wbt.im.bs.imb.sp (Mandarin Version)

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**Routsis Training**  
tel: (978) 957-0700  
fax: (978) 957-1860  
www.traininteractive.com
RJG’S DECOUPLED MOLDING℠

Developed in collaboration with RJG’s corporate headquarters in Traverse City, Michigan, this four course series starts with the major components of the molding process, and progresses to systematic troubleshooting. The DECOUPLED MOLDING℠ system is an ideal processing method intended for anyone interested in optimizing an injection molding process.

Program 1 | Introduction to DECOUPLED MOLDING℠
- Discusses polymerization, crystallinity, additives, regrind and material degradation
- Lists necessary components of a proper part design
- Describes the injection molding process in depth
- Covers molding machine components and their functions

Program 2 | DECOUPLED MOLDING℠ Techniques
- Compares traditional and DECOUPLED MOLDING℠
- Defines the three DECOUPLED MOLDING℠ techniques
- Covers transducers and proper transducer placement
- Introduces signal conditioners and display devices

Program 3 | Reading & Interpreting Data
- Provides participants with an understanding of graphs & scaling
- Explains how to identify different types of graphical curves
- Introduces the integrals used in DECOUPLED MOLDING℠
- Compares ideal and inconsistent pressure curves

Program 4 | Systematic Troubleshooting
- Discusses the importance of proper process documentation
- Explains the appearance and symptoms of defects
- Introduces logical steps involved in troubleshooting defects
- Describes common processing defects, their causes and actions to correct them

DECOUPLED MOLDING℠
4 Interactive Training Programs (4-6 hours)

PRODUCT ID: wbt.im.as.dm
RJG’s eDART™
This course was created for production personnel that monitor and optimize injection molding processes equipped with RJG’s eDART™ process controllers.

This course will greatly benefit setup personnel, process engineers, machine operators, and managers that use (or plan on using) an RJG eDART™ system.

Participants will be better prepared to establish the following:
- Improved processing methods
- Increased operation efficiency
- Machine and process analysis
- Automated quality control
- Improved process stability
Intelligent Molder

Teach your employees the proper way to evaluate any molding machine, injection mold, or molding process.

These courses were produced for technicians and process engineers that want to thoroughly evaluate both the capability and repeatability of a given injection molding machine, injection mold, or injection molding process.

Each course references three in-depth tests and will greatly benefit any participant of RJG’s classroom-based Master Molder Certification Series – either as a primer or as follow-up training.

Program 1 | Machine Evaluation
- Dynamic Check Ring Repeatability Test
- Load Sensitivity Test
- Platen Deflection Test

Program 2 | Mold Evaluation
- Dynamic Cavity Imbalance Test
- Mold Deflection Test
- Tonnage Calculation Worksheet

Program 3 | Process Evaluation
- In-Mold Rheology Test
- Gate Seal Worksheet
- DECOUPLED II Process Sheet

Intelligent Molder
3 Interactive Training Programs (4-6 hours)

PRODUCT ID: wbt.im.as.ims
Math for Molders

*Any molder can benefit from these math-based programs*

This two-part training program was created for all personnel within the injection molding industry who would like to expand or fine tune their math skills. These courses will greatly benefit any participant of RJG’s classroom-based, **Master Molder** Certification Series either as a primer or as follow-up training.

**Program 1**
- Whole Numbers, Negative Numbers and Decimals
- Using a Calculator
- Addition, Subtraction, Multiplication and Division
- Rounding Numbers and Significant Figures
- Formulas, Equations and Order of Operations

**Program 2**
- Metric and Imperial Units
- Length and Distance
- Area, Volume & Flow
- Weight, Mass and Force
- Conversions
- Understanding Percentages
- Calculating Plastic Pressure and Part Shrinkage
- Calculating Tolerances
Process Control Systems

It is crucial for processing personnel to understand both open-loop and closed-loop process control

This training program details process control systems and is designed to help molders make more educated choices. Process Control Systems is a must for any facility which employs (or plans to employ) closed loop process control.

- Open loop vs. closed loop process control
- How process control reduces variation
- Closed loop controllers
- Proper use of process control

Understanding Processing Parameters

Teach your employees the critical parameters that affect processing

This two-part course details injection molding processing parameters. Understanding Processing Parameters discusses individual parameters to help molders maintain more control of their processes. Participants will learn about processing parameters as they relate to the various phases of the injection molding process.

- Description of molding parameters
- Procedures for optimizing several different molding parameters
- The importance of machine calibration
- Considerations for injection, packing, cooling and part removal
Understanding Plastics

*Your employees need to know how and why plastic materials are different*

This program emphasizes material handling, processing, explains regrind and the effects of moisture on molded part properties. Different types of plastics and processing considerations are explained.

Topics include:
- The definition of plastics
- Polymer classification
- Material properties affected by processing
- Proper material handling techniques
- Processing characteristics of virgin and regrind
Troubleshooting Defects

Teach your employees how to reduce scrap and improve part quality

Troubleshooting Defects is packed with information about problems encountered during the injection molding process. This course will help all members of your production team identify, isolate and eliminate the root cause of molded part problems.

- Terminology and descriptions of molding defects
- Systematic corrective troubleshooting procedures
- Process documentation to ease the troubleshooting process
- Long-term and short-term effects of process changes

Injection Mold Setup

Learn safe and efficient die-setting with this comprehensive program

This two part program covers the die-setting process from start to finish with an emphasis on safety. Proper procedures for mold inspection, preparation and installation are outlined.

Injection Mold Setup also covers setup procedures for hydraulic, toggle and hydro-mechanical clamp systems.

- Proper mold installation procedures
- Important safety considerations
- Proper water line set-up
- Safety precautions for mold setup

Troubleshooting Defects

1 Interactive Training Program (2-3 hours)

PRODUCT ID: wbt.im.ps.td

Injection Mold Setup

1 Interactive Training Program (2-3 hours)

PRODUCT ID: wbt.im.ps.ms
Establishing a Scientific Molding Process

Ensure your employees know how to make appropriate and cost-effective decisions

- General Rules for Scientific Processing
- Process Optimization Strategies:
  - Filling / Transfer / Packing
  - Screw Recovery, Delay & Decompression
  - Cooling Time
  - Mold Opening, Mold Closing & Part Ejection
  - Clamping

Processing For Profit

Learn techniques to increase profitability while maintaining part quality

This course focuses on the relationship between the material, the mold and the molding machine.

Also included is practical, up-to-date information about process documentation procedures - as well as some great tips on process optimization.

- Material handling and preparation
- Process documentation and its importance
- Process optimization
- Energy conservation

Processing For Profit

1 Interactive Training Program (1-2 hours)

PRODUCT ID:  wbt.im.ps.pp
Electric Injection Molding

Our two Electric Injection Molding courses will provide participants with a better understanding of the benefits and capabilities of modern all-electric injection molding machines. Safety concerns particular to electric molding machines are also covered.

These programs identify critical differences between hydraulic and all-electric molding machines – and teach participants how to optimize a given process running on an electric molding machine so that they can take advantage of those differences.

Understanding Electric Injection Molding Machines

- General Injection Molding Safety
- Electric Molding Machine Safety
- Machine Guarding
- Comparing Hydraulic and Electric Machines
- Basic Molding Machine Functions
- Efficiency, Accuracy and Repeatability
- Alternative Machine Designs
- Typical Uses for Electric Molding Machines

Processing with Electric Injection Molding Machines

- Closed-Loop Process Controls
- Hydraulic vs. Electric Machine Controls
- Process Optimization Strategies:
  - 1st Stage Filling
  - 1st Stage to 2nd Stage Transfer
  - 2nd Stage Pack
  - Screw Delay
  - Screw Recovery
  - Screw Decompression
  - Cooling Time
  - Mold Opening
  - Part Ejection
  - Mold Closing
  - Clamping

Electric Injection Molding
2 Interactive Training Programs (2-3 hours)

PRODUCT ID: wbt.im.ps.eim
Material Drying Technology
Our two Material Drying Technology courses will provide participants with a better understanding of how different polymers are best dried and prepared for reliable processing. These courses show participants how proper material handling and drying is critical to produce a consistent product and process.

Material Drying Technology, Course 1
- Polymer Basics
- Hygroscopic vs. Non-Hygroscopic Polymers
- Hydrolysis
- Purposes of Drying
- Dewpoint
- Dewpoint Measurement
- Dewpoint Sensors
- Drying Procedures

Material Drying Technology, Course 2
- Hot Air Dryers
- Compressed Air Dryers
- Desiccant Dryers
- Vacuum Driers
- Calculating Material Consumption
- Calculating Residence Time
- Calculating Dryer Capacity

Material Drying Technology
2 Interactive Training Programs (1-3 hours)

PRODUCT ID: wbt.im.ps.dt
The Effects of Shrinkage, Warpage & Part Ejection

Understand three of the most complicated aspects of injection molding

This course is designed to familiarize production personnel with complications that may arise during processing concerning shrinkage, warpage and ejection.

- How packing affects shrinkage and warpage
- Ejection systems for simple and complex geometry
- The effects of part geometry
- Amorphous vs. semi-crystalline polymer behavior

The Effects of Mold Filling, Gating & Weld Lines

What every technician needs to know about mold filling

This course outlines mold filling and how different gating configurations affect filling. Also discussed are weld and meld lines and their effects on molded parts.

- Weld line occurrence and strength determination
- Gate types, location, and importance
- Fatigue and cyclic stress
- Tooling considerations
Injection Mold Maintenance

*Your employees should understand proper procedures for safety and mold care – before, during, and after a production run*

From mold storage to part removal, this course provides participants with good mold maintenance habits and aims to extend tool life & increase productivity – while stressing important safety considerations.

- Proper mold maintenance
- Mold storage and preparation
- Water line maintenance
- Techniques for extending tool life

Injection Molding Machine Maintenance

*Learn the standard maintenance considerations for an injection molding machine*

Designed to introduce the many maintenance considerations for an injection molding machine. Participants are also shown newer technologies; such as laser leveling, ultrasonic tie bar stretch measuring, and portable machine process monitors.

- Basic machine maintenance & safety concerns
- Fluid and platen maintenance
- Screw and barrel maintenance
- Preventative maintenance & logging
Injection Molding Hydraulics

A must for any company utilizing hydraulically-powered injection molding machines

This course demonstrates the importance of hydraulics in the injection molding process.

Machine operators will learn ways to reduce wear on hydraulic components, while more advanced employees concentrate on hydraulic print reading and theory.

Topics include:
- Basic hydraulic theory
- The role of hydraulics in injection molding
- The function and purpose of hydraulic components
- Recognition of hydraulic symbols
- Directional valves and flow controls
- Hydraulic pumps and motors
- Proportional valves and servo valves
- Hydraulic fluid management

Injection Molding Hydraulics
2 Interactive Training Programs (3-4 hours)

PRODUCT ID: wbt.im.ms.hs
Extrusion Blow Molding Series

Our Extrusion Blow Molding training programs were developed in collaboration with The Society of Plastics Engineers (SPE) and were designed to provide participants with a thorough understanding of what’s involved in Extrusion Blow Molding.

The topics covered in this training series include a wide range of extrusion blow molding information and common procedures. All three online courses use standard industry terms and practices with an emphasis on safety, and will enhance the knowledge base of all personnel involved in extrusion blow molding operations.

Program 1  |  Primer
- Material Handling
- Extrusion Blow Molding
- Product Testing
- Basic Terminology
- Understanding Polymers

Program 2  |  Machinery
- Material Preparation
- Part Forming
- Flash Removal, Product Testing & Regrind
- Startup, Color Change and Shut Down
- Emergency Situations

Program 3  |  Problems & Solutions
- Troubleshooting
- Part Defects
- Preventive and Corrective Actions
- Scrap, Regrind & Rework
- Product Tracking

Extrusion Blow Molding Series
3 Interactive Training Programs (3-4 hours)

PRODUCT ID:  wbt.bm.xbm
Math for Blow Molders

This two-part training program was created for all personnel within the blow molding industry who would like to expand or fine tune their math skills.

Program 1
- Whole Numbers, Negative Numbers and Decimals
- Using a Calculator
- Addition, Subtraction, Multiplication and Division
- Rounding Numbers and Significant Figures
- Formulas, Equations and Order of Operations

Program 2
- Metric and Imperial Units
- Length and Distance
- Area, Volume & Flow
- Weight, Mass and Force
- Conversions
- Understanding Percentages

Math for Blow Molders
2 Interactive Training Programs (2-3 hours)

PRODUCT ID: wbt.bm.mfm
Single Screw Extrusion

Our Single Screw Extrusion series is designed to provide training for anyone working in a production environment. These programs use animation and actual production footage to demonstrate complex concepts. Important safety precautions are stressed throughout these training programs.

Tailored for single screw extruders, these training courses provide specific information for all extruders from blown film to profile extrusion. Whether you use single stage or vented extruders, the information will relate to the equipment, materials, and processes operating at your facility.

This training series will help teach any employee on the concepts relating to the machine, material, process, quality, startup, shutdown, problem solving, material handling as well as the correct terminology associated with single screw extrusion.

If your company is a blown film, pipe, or profile extrusion house, we also recommend that you consider using our Advanced Process Simulation Software (PICAT) to help you further develop the applicable skills and capabilities of your production employees.

Program 1 | The Extruder

- Discusses the drive system of the extruder including the motor and gearbox
- Introduces the material feed systems used in Single Screw Extrusion
- Covers the entire screw and barrel assembly including screw design and venting
- The die and adaptor are presented along with the extruder’s control system

Program 2 | Plastic Materials

- A review of the extruder and machine clamping station
- Explains the importance and function of the screw
- The temperature controls found on the machine
- How the blow molding machine functions during its sequences
- An introduction to specific blow molding terminology

Program 3 | The Extrusion Process

- Explains the mechanics of Single Screw material feeding and conveying
- Melting processes for standard and barrier screw designs are covered in detail
- Describes the commonly used types of dispersive and distributive mixing systems
- Covers the pumping, shaping, cooling, and cutting of the extrudate
- Cites important safety precautions for working around extrusion equipment
Single Screw Extrusion

Program 4 | Preventive and Corrective Actions
- Covers common extrusion defects and their typical causes
- Explains the importance of accurate process monitoring
- Differentiates between open and closed loop process control systems
- Way to adjust the process and detect equipment problems

Program 5 | Startup, Changeover and Shutdown
- Provides common procedures to start-up and shut-down an extruder
- Details both upstream and downstream changeovers
- Die, material, and color change considerations are also covered
- The importance of safety and cleanliness are stressed throughout

Program 6 | Quality
- Defines quality and its importance to the success of single screw extrusion operations
- Explains the concepts of quality assurance vs. quality control
- Covers the form, fit, and functionality of the extruded product
- Critical vs. non-critical extrudate defects are compared and contrasted
- The importance of meeting the customer’s needs is stressed throughout the course

Program 7 | Material Handling
- Stresses the importance of proper material handling – from delivery to feedthroat
- Covers various vacuum conveyance and hopper loader systems
- The problems associated with not drying hygroscopic materials
- Details ways to blend materials while avoiding material contamination

Program 8 | Problem Solving and Troubleshooting
- Focuses on getting the right answer in the shortest time
- Easy to follow problem solving steps and rules are detailed
- The importance of documentation and procedure is stressed throughout the course

Single Screw Extrusion
8 Interactive Training Programs (6-10 hours)

PRODUCT ID: wbt.ex.sse
Twin Screw Extrusion

Our Twin Screw Extrusion Series is designed to provide training for anyone working in a production environment. These programs use animation and actual production footage to demonstrate complex concepts. Important safety precautions are stressed throughout these training programs.

Tailored for Twin Screw Extruders, these training courses provide specific information for profile, pipe, or compounding extruders. Whether you use a co-rotating or counter rotating extruder, the information will relate to the equipment, materials, and processes operating at your facility.

This training series will help teach any employee on concepts relating to the machine, material, process, quality, startup, shutdown, problem solving, material handling as well as the correct terminology associated with Twin Screw Extrusion.

If your company is a pipe or profile extrusion house, we also recommend that you consider using our Advanced Process Simulation Software (PICAT) to help you further develop the applicable skills and capabilities of your production employees.

Program 1 | The Extruder
- Discusses the drive system of the extruder including the motor and gearbox
- Introduces the material feed systems used in Twin Screw Extrusion
- Covers the entire screw and barrel assembly including screw design and venting
- The die and adaptor are presented along with the extruder’s control system

Program 2 | Plastic Materials
- Introduces the plastics industry and the nature of plastic materials
- Explains complex concepts such as melt viscosity and polymer flow
- Provides detailed explanations of both shear and shear heating with plastics
- Covers the behavior of both amorphous and semi-crystalline polymers
- Gives an understanding of shrinkage, orientation, and degradation

Program 3 | The Extrusion Process
- Explains the mechanics of Twin Screw material feeding and conveying
- Melting processes for both programmed and fixed screw designs are covered
- Describes the commonly used types of dispersive and distributive mixing systems
- Covers the pumping, shaping, cooling, and cutting of the extrudate
- Cites important safety precautions for working around extrusion equipment
Twin Screw Extrusion

Program 4 | Preventive and Corrective Actions
- Covers common extrusion defects and their typical causes
- Explains the importance of accurate process monitoring
- Differentiates between open and closed loop process control systems
- Way to adjust the process and detect equipment problems

Program 5 | Startup, Changeover and Shutdown
- Provides common procedures to start-up and shut-down an extruder
- Details both upstream and downstream changeovers
- Die, material, and color change considerations are also covered
- The importance of safety and cleanliness are stressed throughout

Program 6 | Quality
- Defines quality and its importance to the success of twin-screw extrusion operations
- Explains the concepts of quality assurance vs. quality control
- Covers the form, fit, and functionality of the extruded product
- Critical vs. non-critical extrudate defects are compared and contrasted
- The importance of meeting the customer’s needs is stressed throughout the course

Program 7 | Material Handling
- Stresses the importance of proper material handling – from delivery to feedthroat
- Covers various vacuum conveyance and hopper loader systems
- The problems associated with not drying hygroscopic materials
- Details ways to blend materials while avoiding material contamination

Program 8 | Problem Solving and Troubleshooting
- Focuses on getting the right answer in the shortest time
- Easy to follow problem solving steps and rules are detailed
- The importance of documentation and procedure is stressed throughout the course

PRODUCT ID: wbt.ex.tse
Math for Extruders

This two-part training program was created for all personnel within the extrusion industry who would like to expand or fine tune their math skills.

Program 1
- Whole Numbers, Negative Numbers and Decimals
- Using a Calculator
- Addition, Subtraction, Multiplication and Division
- Rounding Numbers and Significant Figures
- Formulas, Equations and Order of Operations

Program 2
- Metric and Imperial Units
- Length and Distance
- Area, Volume & Flow
- Weight, Mass and Force
- Conversions
- Understanding Percentages

Math for Extruders

2 Interactive Training Programs (2-3 hours)

PRODUCT ID: wbt.ex.mfm
Plastic Part Design Series

Our Plastic Part Design Series provides part designers with an understanding of the plastic part design process. This extensive interactive training course also addresses many of the factors and concerns associated with part design. Dr. Robert Malloy, a respected author and professor at the University of Massachusetts, Lowell, developed these comprehensive interactive training programs.

Program 1 | Product Development & the Prototype Process
- Product development steps & concurrent engineering
- Computer simulations for design
- Rapid prototyping and tooling processes

Program 2 | Mechanical Behavior of Polymers
- The mechanical behavior of polymers
- Stress/strain curves and visco-elastic behavior of polymers
- Creep and stress relaxation

Program 3 | Mold Filling, Gating & Weld Lines
- Fatigue and cyclic stress
- Mold filling processes
- Gate types, location, and importance
- Weld line occurrence and strength determination

Program 4 | Shrinkage, Warpage, & Part Ejection
- How packing affects shrinkage and warpage
- The effects of part geometry
- Amorphous vs. semi-crystalline behavior
- Ejection systems for simple and complex geometry

Program 5 | Mechanical Fasteners, Press & Snap Fits
- Assembly techniques
- Snap fit design and considerations
- Design for assembly and disassembly
- Boss and screw design / press fit design and strength equations

Program 6 | Welding & Adhesives Bonding Technology
- Various part welding processes
- Joint design for injection molded parts
- Adhesive bonding applications & techniques
- Wetting, surface attraction and curing of adhesives
Mold Design & Moldmaking Series

This comprehensive 9-part course was created with help from many of the world’s leading tool manufacturers and suppliers and is intended for tool designers, mold makers, engineers, part designers, and anyone involved in the tool procurement process.

The Mold Design and Moldmaking Series familiarizes participants with the different types of injection molds, contemporary machining methods, and many of the available mold components.

This course also provides the participant with a tool design methodology and a sample mold specification guide for reference.

**Program 1 | Injection Mold Fundamentals**
- The four basic functions of an injection mold
- Part design considerations
- Material considerations
- Molding machine considerations
- Initial mold design

**Program 2 | Mold Machining Methods, Part 1**
- Conventional and CNC milling
- Conventional and CNC lathe
- Conventional and CNC surface grinding
- The advantages and disadvantages to each machining method
- Finishes and stresses with each process

**Program 3 | Mold Machining Methods, Part 2**
- Conventional and CNC die sinking EDM
- CNC wire EDM
- Polishing
- Inspection equipment
- Seal-offs

**Program 4 | 2-Plate, 3-Plate, and Hot Runner Molds**
- Explains the three basic mold designs and their construction
- Advantage and disadvantage to each design
- Common uses for each design
- Explains different hot runner systems
- Parting line locks
- Specialty molds
Mold Design & Moldmaking Series

Program 5 | Mold Bases, Tool Steels & Heat Treating
- Tooling materials and their properties
- Various heat treating methods
- Introduces alternative materials, such as Beryllium-copper
- Features DME standardized mold bases

Program 6 | External & Internal Actions
- Slides, core pins, & lifters
- Unscrewing & expandable cores
- Inserts
- Dissolvable cores
- Preload and seal-offs

Program 7 | Part Ejection, Venting & Cooling
- Ejector pins, sleeves, blades and lifters
- Stripper plates and pneumatic ejection
- Water lines, bubblers, baffles and conductive cooling rods
- Multi-stage ejection and ejection return
- Covers different forms of part venting

Program 8 | Gating Methods
- Commonly used Gates and their characteristics
- Introduction to hot runner gate design
- Introduction to cold runner gate design
- Explains manual and automatic gate removal
- Discusses gate location determination

Program 9 | Runners, Filling Software & the Mold Design Process
- Parting line determination and considerations
- Core and cavity block configuration
- Cooling line and ejection layout
- Additional mold components
- Mold filling analysis capabilities

Mold Design & Moldmaking Series
9 Interactive Training Programs (9-16 hours)

PRODUCT ID: wbt.ds.md
Blueprint Reading

*Your employees should know how to accurately locate and interpret dimensions on engineering drawings*

The six programs in our blueprint reading training course develop workers’ abilities to accurately locate and interpret dimensions on engineering drawings. These training programs are based on ANSI standards and incorporate input from a broad industrial cross-section.

**Program 1 | Introduction to Engineering Drawings**
- The six principal views of a third-angle projection
- Identify the ISO symbols for third-angle and first-angle projections
- Auxiliary views, partial views, and enlarged views
- Determine which line takes precedence over another

**Program 2 | Multiview Drawings**
- Outside, inside, vernier and electronic micrometers
- Types of dial indicators
- Dial indicating gauges; snap gauges, calipers, depth gauges

**Program 3 | Sectional Views**
- Determine which portion of the part is shown in section
- Explain the purpose of section lines and identify the ways they’re used
- Identify and interpret the common drafting conventions applied to sectional views

**Program 4 | Dimensions and Tolerances, Part 1**
- Identify the size and/or location for a given part feature
- Correctly calculate the tolerance specified for a given part feature

**Program 5 | Dimensions and Tolerances, Part 2**
- Locate and interpret dimensions specified by chain, baseline and direct dimensioning methods
- Identify a datum feature and explain its purpose
- Explain how MMC and LMC apply to internal and external features
- Calculate allowance
- Identify a surface finish specification

**Program 6 | Part Feature Specifications**
- Identifies twelve of the most common part features on a drawing
- How to correctly interpret part specifications

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**Blueprint Reading**
6 Interactive Training Program (6-10 hours)

PRODUCT ID: wbt.ts.bpr
Geometric Dimensioning & Tolerancing

These courses are a must for any company manufacturing to GD&T requirements

This four-disc series builds the ability to read and interpret GD&T symbols. Understanding the international engineering language of Geometric Dimensioning & Tolerancing is essential for communicating in the global marketplace.

Program 1 | Basic Principles
- Definition and benefits of GD&T
- Basic Terminologies
- Maximum and Least material condition
- Clearance, interference and transition fits

Program 2 | Interpreting GD&T Symbols
- Diameter symbol
- Coordinate vs. position system tolerance zones
- Effect of material condition on size of geometric tolerance

Program 3 | Form and Orientation Tolerances
- Flatness, straightness, circulatory, and cylindricity
- Orientation tolerances; perpendicularity, angularity, and parallelism
- Application of maximum material condition principle and inspection procedures

Program 4 | Profile, Runout & Location Tolerances
- Profile tolerances
- Runout tolerances; position, concentricity, and symmetry

Geometric Dimensioning & Tolerancing
4 Interactive Training Programs (4-8 hours)

PRODUCT ID: wbt.ts.gdt
Training Assurance Program

Routsis is the only plastics training provider that will conduct an onsite visit to assist you in establishing a specific training plan for your entire workforce. During our Training Assurance Program (TAP), we’ll help list the respective job responsibilities of every position in your operation and suggest a plan containing established goals with a timetable for completing the outlined training. By developing and enhancing the skills of each employee and job position at your facility, you’ll have a more versatile workforce and will never have to rely on one or two go-to production personnel.

While we’re onsite, we help establish critical metrics that include; scrap rate, set-up times, troubleshooting times, accidents, mold and machine damage, and more. Continuous improvement is the objective of any training initiative and these key metrics are monitored throughout the training initiative and reported in dollars on a monthly basis so that your operation continuously strives to achieve its goals and, more importantly, will not lose sight of the goal of keeping on top of everything within the training plan – which serves as a the blueprint.

You’ll receive all of the necessary tools to make your training initiative succeed and the net result is a lean, versatile, well-skilled workforce that will keep you profitable and competitive for years to come. Typical payback on your training investment averages a mere 3.4 months.

When we establish your company’s structured training plan, we integrate multiple forms of training designed to develop skills for your employees and include; computer-based interactive training (online), and plant-specific on the floor exercises created for each job position at your facility. The plan also includes training that we do not supply – such as machine-specific trade shows, outside seminars, and more.

4 Questions Our Competitors Hope You Never Ask

▶ Will your plastics professionals come to my plant and help devise a structured training plan?
▶ Do you supply the necessary tools to customize my interactive training?
▶ Do you provide plant specific on-the-job training tasks?
▶ Will you teach me how to use, track, monitor, and customize my training?

While we’re onsite, we help establish critical metrics that include; scrap rate, set-up times, troubleshooting times, accidents, mold and machine damage, and more. Continuous improvement is the objective of any training initiative and these key metrics are monitored throughout the training initiative and reported in dollars on a monthly basis so that your operation continuously strives to achieve its goals and, more importantly, will not lose sight of the goal of keeping on top of everything within the training plan – which serves as a the blueprint.
Routsis offers extensive implementation assistance and is second to none within the plastics industry. This includes facilitator instruction on how to use, customize, track and implement the online training.

We ensure that your training gets up and running quickly and offer support via manuals, instructional DVDs, monthly ‘Train the Trainer’ webinars, phone and email – all at no additional charge. We will also configure your training station(s) on-site at no additional cost.

All of our interactive training courses are accompanied by on-the-floor exercises and are provided in an electronic format so that you can fine tune them as needed. Our courses are also very easy to customize by adding videos, pictures, questions, or plant-specific work instructions and we’ll show you step-by-step how to do it. You can create your own new courses on subject matter and procedures that require emphasis – as this has become a very hot topic expressed by managers of our industry.

Training is an ongoing process, and while we are on site, we detail the entire process; from training room setup and the scheduling and reporting progress spreadsheets to the key metrics that should be closely monitored throughout the training initiative at your facility.

“Routsis didn’t just sell us a bunch of training courses. They worked with us to determine our needs and came to our plant and configured the training station the way we wanted. We also learned how to customize the courses - adding video, audio and pictures of our unique processes and equipment. After the visit, we were provided with specific training plans for each job position as well as Task Sheets to ensure everyone on the production floor receives the same training. I strongly urge anyone who is serious about training to consider what Routsis has to offer.”

Jerry Stare
Plastics Engineer
Ames True Temper (Camp Hill, PA)